# Myopia and pathological myopia

Myopia, also known as “being short sighted”, causes your vision to be blurry in the distance but clearer when looking at things up close. It’s a very common focusing problem, and for most people it can be easily corrected using glasses or contact lenses to make vision clear and crisp. Most people with myopia have healthy eyes.

Pathological myopia is different from simply being short sighted. Pathological myopia means that you are very short sighted and that this has caused degenerative changes to the back of your eye. Pathological myopia can cause a reduction in your sight that can’t be corrected with glasses or contact lenses.

## How does the eye focus light?

Light rays enter the front of our eye through the clear cornea and lens, which bend the light, focusing it on the retina at the back of the eye. This gives us a clear, sharp image.

The retina is a delicate tissue that lines the inside of your eye and is made up of light-sensitive cells. Your retina converts the light into electrical signals that travel along the optic nerve to our brain. The brain interprets these signals so we can “see” the world around us.

The retina is supplied with blood by a delicate network of blood vessels on its surface and by a layer of blood vessels (the choroid) underneath the retina. The central part of the retina is called the macula and is very important for seeing the detail and colour of things we look at directly.

## What is myopia?

For vision to be clear, light entering your eye needs to be focused accurately on your retina. Light entering your eye is first focused by the cornea (the clear window at the front of the eye) and then finely focused by the lens inside your eye. Ideally, when light enters your eye, this focusing system should ensure that it’s sharply in focus when it reaches the retina. This will mean that you see everything in focus without any blurriness.

However, if someone has a focusing or “refractive” error, light is not focused correctly onto the back of their eye and their vision is not clear.

There are three main types of refractive errors where the eye is unable to correctly focus light onto the retina. These are:

* **Myopia** (short-sightedness) which causes your vision to be blurry in the distance and clearer when looking at things close up
* **Hypermetropia** (long-sightedness) which means that your eye focuses better in the distance than when looking at things close up
* **Astigmatism** can cause blurry vision at all distances and is caused by the cornea or lens of the eye not being perfectly curved (rounded). Astigmatism is very common and many people who wear glasses have some degree of astigmatism.

In people with myopia, the light entering the eye comes to a focus point before it reaches your retina. This makes vision blurry and is caused by the eyeball being too long or the cornea being more steeply curved.

People with myopia require a prescription for glasses or contact lenses with a minus lens power to correct their vision. This lens reduces the excessive bending of light by the eye, thereby focusing it onto the retina rather than in front of it, to produce a sharp clear image.



**Image description:** Diagram showing the cross section of an eye including the labels cornea, lens, macula, retina, choroid, optic nerve. The diagram shows that light entering the eye through the cornea and lens comes to a focus point in front of the retina when the eye is myopic.

## Development of myopia

Myopia can start at any age, but more common for it to develop and worsen in childhood or teenage years. Myopia usually stabilises in adulthood but there can be periods when it continues to increase so that a person’s glasses or contact lenses need to be made stronger. These episodes can happen at any age but are more common if you already have higher levels of myopia. In general, the younger you are when your myopia starts, the more likely you will develop a higher level of myopia over time. For some people their myopia stabilises, staying the same for many years.

## What causes myopia?

It’s not known what causes myopia and research suggests there could be several different reasons why you may become short sighted.

Myopia often runs in families so is thought to be partly genetic. Children who have one parent with myopia have a higher chance of developing it. This chance increases if both parents have myopia.

Some environmental causes of myopia in children have also been studied. Spending too little time outdoors in daylight and excessive close work are factors that are thought to increase the risk of myopia developing. Although children should be encouraged to read, the current recommendation is that they should also spend some time each day doing outdoor activities.

Myopia which develops in older adults can be caused by other conditions. If you have diabetes, you may experience temporary myopia when your blood sugar level is not well controlled. Glasses alone may not be the best way to correct this change in your vision. Good control of your blood sugar levels will help stabilise your vision; your diabetic nurse and GP will be able to help you to achieve this.

Some types of cataracts can also cause myopia to develop. The increase in myopia caused by early cataracts, known as myopic shift, can be corrected by glasses. When cataracts continue to develop, glasses may no longer be helpful and surgery to remove the cataracts would then be required to improve your vision.

You can find more information about diabetes and cataracts on our website [**rnib.org.uk/eyehealth**](https://www.rnib.org.uk/your-eyes/how-to-keep-your-eyes-healthy/) or by calling our Helpline on **0303 123 9999**.

## How is myopia graded?

Optometrists (also known as opticians) measure the focusing power of your eye in dioptres. This is a technical term for how strong a lens would have to be to correct the focusing of your eye and give you clear vision.

Myopia is written with a minus power on your glasses or contact lens prescription; for example, a prescription for three and a half dioptres of myopia would be written: -3.50 dioptres (D). The minus sign indicates that the lens is correcting for myopia. The higher the number, the more short-sighted you are.

* Mild myopia includes powers up to -3.00 dioptres (D)
* Moderate myopia, a power of -3.00D to -6.00D
* High myopia is usually powers over -6.00D

Most people with myopia of less than -6.00D don’t develop any further problems. This is sometimes known as simple myopia, meaning that your eyes are healthy and that the blurriness that your myopia causes is easily corrected with glasses or contact lenses.

## High myopia

If you have myopia higher than -6.00D, you may have a greater risk of developing certain other eye conditions. However, this is not the case for everyone with myopia above -6.00D, and for most people their eyes will be healthy.

High myopia increases the risk of developing the following other eye conditions:

### Posterior vitreous detachment (PVD)

A PVD occurs because of natural changes to the clear gel (the vitreous) in the eye as we get older, commonly when we are in our 50s. However, PVD can develop earlier than this if you have high myopia. A PVD doesn’t cause sight loss, but you may have symptoms such as seeing floaters (small dark spots or shapes) and flashing lights.

It’s important if you notice an onset of floaters or flashing lights that you have your eyes checked straight away (within 24 hours) by an optometrist or at your local Accident and Emergency department (A&E) so that an accurate diagnosis can be made. This is because symptoms of a PVD are similar to those of a different eye condition called retinal detachment, which needs prompt treatment to prevent sight loss in the affected eye.

You can find more information about PVD on our website [**rnib.org.uk/eyehealth**](https://www.rnib.org.uk/your-eyes/how-to-keep-your-eyes-healthy/) or by calling our Helpline on **0303 123 9999**.

### Retinal detachment

If you have high myopia, there is a higher chance of you developing a retinal detachment. This is where a hole or tear can develop in your retina. If a hole or tear develops, fluid in your eye can leak through this gap and behind your retina, which can cause your retina to detach from the back of your eye. A retinal detachment can lead to sight loss in that eye if it’s not treated promptly.

The symptoms of a retinal detachment are:

* floaters
* flashing lights
* a dark shadow in your vision
* blurred vision

It’s important if you notice any of these symptoms or any new symptoms that you have your eyes checked immediately (within 24 hours) by an optometrist or at your local A&E or eye casualty so that an accurate diagnosis can be made.

Retinal detachment can be treated by surgery to re-attach the retina to the back of the eye. The sooner surgery is carried out the better the results are likely to be. If it is thought that you have a retinal detachment, it’s important that you are seen by an ophthalmologist (hospital eye doctor) as soon as possible so they can assess the detachment and decide which type of surgery will be best for you.

You can find more information about retinal detachment on our website [**rnib.org.uk/eyehealth**](https://www.rnib.org.uk/your-eyes/how-to-keep-your-eyes-healthy/) or by calling our Helpline on **0303 123 9999**.

### Glaucoma

Being short sighted can mean that you’re at a higher risk of developing glaucoma. Glaucoma is a condition where the optic nerve, which carries electrical signals from your retina to your brain, is damaged by the pressure of the fluid inside your eye. Treatment for glaucoma is given to lower your eye pressure to prevent damage to your optic nerve and protect your sight.

If you’ve been diagnosed with glaucoma, then you will either be prescribed eye drops or given a type of laser treatment to help control your eye pressure. If you are prescribed eye drops, it’s very important that you use your eye drops as advised by your eye specialist as this will prevent you from experiencing any future sight loss due to glaucoma. It’s also important to attend any hospital eye appointments regularly to monitor your glaucoma.

You can find more information about glaucoma on our website [**rnib.org.uk/eyehealth**](https://www.rnib.org.uk/your-eyes/how-to-keep-your-eyes-healthy/) or by calling our Helpline **0303 123 9999**.

### Cataract

You may develop cataracts at an earlier age if you are very short sighted. A cataract is when the natural lens inside your eye becomes cloudy. This cloudiness can cause symptoms such as blurred or misty vision, colours appearing dull, or problems seeing clearly at night. Cataracts can take some time to develop before they affect your vision. When your daily activities are being affected by your cataracts, they can be treated using surgery to remove the cloudy lens and replace it with a clear artificial one.

You can find more information about cataracts on our website [**rnib.org.uk/eyehealth**](https://www.rnib.org.uk/your-eyes/how-to-keep-your-eyes-healthy/) or by calling our Helpline **0303 123 9999**.

### Looking after your eyes

As you are at higher risk of developing these eye conditions when you have a high level of myopia, it’s important to have regular eye examinations with your optometrist, who will be able to check for any changes to your eye health.

Your optometrist will let you know how often they would like to see you for a routine eye examination, but if you have any new symptoms or concerns, you should have your eyes examined straight away, even if you are not due for your routine examination.

## Pathological myopia

If you’ve been diagnosed with “pathological” or “degenerative” myopia, you have high myopia, and your eye also shows degenerative changes affecting the retina at the back of the eye.

High myopia usually means that your eyeball is longer than normal. This lengthening of your eye causes your retina to become thinner and stretched. This stretching can lead to changes to the retina that can cause a reduction in your sight. Sight problems caused by pathological myopia cannot be corrected with glasses or contact lenses.

However, not everyone with high myopia will develop pathological changes and their eyes may remain healthy. The higher your myopia is, the greater your risk is of developing pathological changes. But even if you do develop pathological myopia, this may not always cause problems with your sight.

For some people, the changes due to pathological myopia can get worse with time. How this may progress can vary from person to person, and will depend on which changes have developed.

In some people, these changes remain stable for many years and may affect their sight very little. However, if the central part of your retina, known as the macula, is affected, then you may have significant vision problems.

If your optometrist detects any pathological changes during an eye examination, you may be referred to the hospital eye clinic to be seen by an ophthalmologist.

## How does pathological myopia affect the retina?

### Retinal atrophy

As you become more myopic, your eyeball becomes longer. This causes your retina to stretch and become thinner. This can cause areas of atrophy, areas where your retina has become very thin and is no longer working.

When an optometrist or ophthalmologist looks into your eye, areas of atrophy look very pale and blood vessels that are behind the retina can be seen through them. If you have areas of atrophy on your retina, your vision at these areas may be reduced or you may even have blank patches in your vision. Retinal atrophy can occur anywhere on the retina. If retinal atrophy occurs at the macula, your detailed central vision in that eye can be affected.

### Lattice degeneration

At the far edges of your retina your optometrist or ophthalmologist may be able to see a type of retinal thinning known as lattice degeneration. Lattice degeneration doesn’t cause any symptoms and is commonly detected during a routine eye test. It would normally be monitored by an optometrist or ophthalmologist and usually causes no problems. However, the presence of lattice degeneration can increase your risk of developing a retinal detachment. If your ophthalmologist feels you are at risk of a retinal detachment, they may suggest laser treatment or cryotherapy (freezing treatment) to prevent a retinal detachment from developing. However, most people with lattice degeneration do not need treatment.

### Lacquer cracks

As the eye stretches it can cause breaks to appear on the retina, which your optometrist or ophthalmologist can see as fine lines. These are known as lacquer cracks and are breaks that occur in the membrane (Bruch’s membrane) between the retina and its underlying blood supply (the choroid layer). There isn't any treatment for lacquer cracks, and they don't affect your vision directly. However, they can be the first signs of possible further problems, which can develop and cause changes to your vision. If you have lacquer cracks, your ophthalmologist or optometrist will monitor your eyes closely for any further problems.

### New blood vessels (neovascularisation)

In some people, new blood vessels can grow from the blood supply of the choroid layer underneath the retina, and come through lacquer cracks or areas of atrophy onto the retina. This is known as choroidal neovascularisation (CNV). These new blood vessels can bleed very easily as they are very weak and fragile, causing damage and swelling to the retina. This damage causes scarring, which can permanently affect your vision. Neovascularisation can occur anywhere on the retina, including at the macula, where it can significantly affect your vision.

### Myopic macular degeneration

If any of these degenerative changes develop at the macula, it’s known as “myopic macular degeneration” or “myopic maculopathy”. This can affect your central detailed vision. Changes to your central vision can make it difficult to read and see people's faces clearly. You may also find that your colour vision is affected, and straight lines look bent or distorted.

Myopic macular degeneration may be referred to as “dry” or “wet”. “Dry” myopic macular degeneration is when there is retinal atrophy, thinning of the retina, or scarring at the macula. Unfortunately, there isn’t any treatment for the dry form of myopic macular degeneration but there is a treatment for the wet form

“Wet” myopic macular degeneration is where there is growth of new blood vessels at the macula. This is often referred to as myopic choroidal neovascularisation or myopic CNV.

Myopic CNV can develop quickly, and symptoms can include:

* distortion, straight lines appearing wavy, curved or bent
* blurry vision
* a blind or grey spot in the centre of your vision
* colours looking dull or different than usual.

**If you suddenly notice any of these symptoms, it’s important to have your eyes checked straight away by your optometrist, or at your local A&E or eye casualty.**

About five to 10 per cent of people with pathological myopia develop myopic CNV. It is possible to develop myopic CNV in both eyes but in most cases, it affects one eye only.

### Forster Fuchs spot

Myopic CNV can lead to scarring at the macula, known as a Forster Fuchs spot. This is a circular area of pigment an optometrist or ophthalmologist can see that develops after the new blood vessels and bleeding has gone. This scarring can cause a blank or missing patch in your central vision. Unfortunately, there is no treatment for retinal scarring.

### Other changes

Pathological myopia can also cause other changes to the eye such as myopic traction maculopathy (foveoschisis). The retina is made up of several layers of different cells. Myopic foveoschisis is where there is splitting of these retinal layers at the macula because an area of the back of the eye develops an extra bulge out wards. This bulging is called a posterior staphyloma.

Myopic foveoschisis generally develops slowly and at first may not cause any changes to your vision. As it progresses, it can cause your central vision to be blurred or distorted. In more advanced stages, it can cause a macular hole or retinal detachment to develop, which requires treatment with surgery.

## What treatments are there for pathological myopia?

The type of treatment you need will depend upon the degenerative change that has developed. Unfortunately, not all the changes that happen in pathological myopia, such as retinal atrophy and lacquer cracks can be treated.

It’s important that these changes are monitored by your optometrist or ophthalmologist. If you notice any changes to your vision, you should have your eyes checked straight away.

### Myopic choroidal neovascularisation (myopic CNV)

If you start to develop new blood vessels at the macula, this can be treated with anti-vascular endothelial growth factor (anti-VEGF) medication. Anti-VEGF medications work by reducing the growth of new, leaky blood vessels and the oedema (swelling) they may cause. This treatment can reduce the risk of scarring and damage to the retina caused by these new vessels, which in turn can help to avoid further deterioration in sight.

If you are diagnosed with myopic CNV, it’s important that it is treated quickly, before the new blood vessels have caused too much damage to the macula. The main aim of the treatment is to stop any further new blood vessels from growing, preventing further deterioration in your sight; however, treatment may also help to improve vision in some people.

Generally, myopic CNV responds well and quickly to treatment with anti-VEGF.

Anti-VEGF medicines are injected into the vitreous gel. This is called an intravitreal injection. The injection is given in a clean sterile room or an operating theatre to reduce the risk of infection. Before the injection, you’ll be given anaesthetic eye drops to make your eye numb, so the injection is not painful.

You can find more information about anti-VEGF treatment on our website [**rnib.org.uk/eyehealth**](https://www.rnib.org.uk/your-eyes/how-to-keep-your-eyes-healthy/)**,** or by calling our Helpline on **0303 123 9999**.

After your first injection, you will normally be monitored at the eye clinic every month for the first couple of months. You may be given further injections at these visits if your ophthalmologist thinks they are needed. If your condition becomes stable, then you may not need further injections, but you’ll still be monitored closely, normally around every three months for the first year. However, you should go straight back to the eye clinic if you feel your vision is deteriorating or start to notice any distortion in your vision.

### Lattice degeneration

Most people with lattice degeneration don’t need any treatment. This is because lattice degeneration itself doesn’t cause any problems with your sight. Your optometrist or ophthalmologist will monitor you for changes associated with your lattice degeneration.

In some cases, lattice degeneration may be associated with a retinal tear, in which case it may be treated with laser treatment (known as laser retinopexy) or cryotherapy (freezing treatment) to seal the tear and prevent it from developing into a retinal detachment.

If you have lattice degeneration, it’s important to be aware of any new or changing symptoms of floaters and flashing lights. If you do experience any new symptoms, you should have your eyes examined straight away by your optometrist, at your local A&E or eye casualty.

## How can I see better?

Most people who have myopia don’t have any complications and will only ever need glasses or contact lenses to make their vision sharper. If your prescription is over -10.00D, then you would be entitled to an NHS complex lens voucher to use towards the cost of your glasses or contact lenses. Your optician would be able to tell you if your prescription would entitle you to this and if so, how much this voucher is worth.

The higher your level of myopia is, the higher the risk of developing eye conditions associated with myopia and pathological myopia. If your retina has been damaged, then your vision may need more than prescription glasses to help you see well.

A low vision clinic, which is usually located in the eye hospital, can be very helpful. A low vision specialist can prescribe low vision aids, such as magnifiers, to help you make the most of your vision by making things bigger and easier to see. They can also provide practical help and advice on how to use your remaining vision by making things bigger, brighter and bolder. Your optometrist, ophthalmologist, GP or Eye Care Liaison Officer (ECLO) would be able to refer you to the low vision clinic for an assessment.

## Can I stop myopia from getting worse?

Myopia tends to get worse in children and teenagers as they grow. In general, the younger you are when you start becoming myopic, the faster it can develop and the higher it will be when you reach adulthood. Myopia usually stops getting worse at around the age of 20.

There’s currently no single treatment available that appears to stop the progression of myopia. Several studies have looked at treatments involving either eye drops or special lenses to try to slow the progression of myopia in children.

Research has shown that a certain eye drop (which makes your pupil larger and relaxes the muscles in your eye) can slow the progression of myopia, but these can cause side effects at high strengths – such as difficulty with close up work and sensitivity to bright light. A lower strength version of this drop isn’t available in the UK currently.

Myopia control lenses are a special type of contact or spectacle lens that are currently being researched, as they may help to slow the progression of myopia in children. There are ongoing studies into how well these lenses work and how well the treatment works in the long term. The current scientific evidence does not tell us how effective this treatment is for children in the UK and Europe, and whether it is beneficial in the long term. Myopia control lenses are becoming more widely available privately but are not currently available on the NHS.

Corneal reshaping contact lenses (orthokeratology) and bifocal contact lenses may also slow down the progression of myopia in children. However, further studies are needed to find out how well the treatment works in the long term.

## Is there anything I can do to prevent pathological myopia?

If you already have high myopia, there are no treatments available to stop your eye from developing the complications of high or pathological myopia. There’s currently no evidence to suggest that diet, vitamins or supplements can affect your chances of developing pathological myopia or make it better or worse.

Currently treatment is aimed at improving your vision and to treat any complications if they happen. You will be monitored regularly by your optometrist or ophthalmologist who will check the health of your eyes. It’s important to have your eyes checked by your optometrist or ophthalmologist as soon as possible if you notice any changes to your vision or any new symptoms.

## Light sensitivity

Many people with pathological myopia find that they are sensitive to light, known as photophobia. You may find it difficult to adapt to changing levels of lighting or find bright light uncomfortable. Using sunglasses, tinted lenses and sunshields can all help to reduce the discomfort and glare you may experience in everyday living.

You can find more information about light sensitivity on our website [**rnib.org.uk/eyehealth**](https://www.rnib.org.uk/your-eyes/how-to-keep-your-eyes-healthy/)or by calling our Helpline on **0303 123 9999**.

## Driving

If you have pathological myopia or an eye condition caused by high myopia, you may have sight problems which cannot be corrected with glasses or contact lenses. If this is the case, you are required by law to tell the Driver and Vehicle Licensing Authority (DVLA) if the changes are affecting both of your eyes. You may be able to continue driving if your sight meets the DVLA visual standards. Your optometrist or ophthalmologist will be able to tell you if your vision meets the DVLA standard or if you need to tell the DVLA about your sight problems.

## Coping

Most people who have myopia find their vision is clear and sharp when they wear their glasses or contact lenses. However, it’s completely natural to be upset when you are diagnosed with an eye condition associated with high myopia or pathological myopia. It’s normal to find yourself worrying about the future and how you will manage a change in your vision.

It can sometimes be helpful to talk over some of these feelings with someone outside your circle of friends or family. At RNIB, we can help with our telephone Helpline and our Sight Loss Counselling service. You may also find your GP or social worker can help you find a counsellor if you feel this might help you.

Your eye clinic may also have an Eye Care Liaison Officer or ECLO, who can be on hand to provide practical and emotional support about your eye condition.

## Further help and support

Having pathological myopia can cause changes to your vision in the long term, but much can be done to help you make the most of your remaining vision and adapt to any changes.

There are lots of things that you can do to make the most of your remaining vision. This may mean making things bigger, using brighter lighting or using colour to make things easier to see. We have a series of leaflets with helpful information on living with sight loss, including how to make the most of your sight. You can find out more about our range of titles by calling our Helpline **0303 123 9999**.

You can also ask your ophthalmologist, optometrist, GP or ECLO about low vision aids and having a low vision assessment. During this assessment you’ll be able to discuss the use of magnifiers and aids to see things more clearly.

Local social services should also be able to offer you information on being safe in your home and getting out and about safely. They should also be able to offer you some practical mobility training to give you more confidence when you are out.

If you have sight changes due to pathological myopia, you may be worried about finding work, or staying in your job. Our employment team can provide specialist support and advice about employment for people with sight loss. You can contact us via our Helpline on **0303 123 9999**.

### Other useful contacts

The Macular Society offer local support groups for people with macular eye conditions or central vision loss. They have working age groups as well as groups via Skype. In December 2021 they launched a support group specifically for people with myopic macular degeneration.

**Macular Society**

PO Box 1870

Andover

SP10 9AD

Tel: **0300 3030 111**

Web:[**macularsociety.org**](https://www.macularsociety.org/)

**Driver and Vehicle Licensing Agency (DVLA)**

Drivers Medical Enquiries

DVLA

Swansea SA99 1TU

Tel: **0300 790 6806**

Web: [**gov.uk**](https://www.gov.uk/government/organisations/driver-and-vehicle-licensing-agency)

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Send your comments to us by emailing us at **eyehealth@rnib.org.uk** or by writing to the Eye Health Information Service, RNIB, 105 Judd Street, London, WC1H 9NE.

If you have questions about anything you’ve read in this factsheet, or want to speak to someone about your eye condition, please get in touch with us. We’re here to support you at every step.

The RNIB Helpline is your direct line to the support, advice, and products you need. We'll help you to find out what's available in your area and beyond, both from RNIB and other organisations.

Call our Helpline on **0303 123 9999**, we’re ready to answer your call Monday to Friday 8am – 8pm and Saturday 9am – 1pm. You can also email us at **helpline@rnib.org.uk**. You can also say, “**Alexa, call RNIB Helpline**” to an Alexa-enabled device.

You can also get in touch by post or by visiting our website:

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